

Name: _____

Clear your desk of everything excepts pens, pencils and erasers. If you have a question raise your hand and I will come to you.

1. (2 points) **Fill-in-the-Blank. No work needed. No partial credit available.**

Let $f(x) = \frac{x}{x^2+1}$.

- The interval(s) on which $f(x)$ is increasing are _____.
- The interval(s) on which $f(x)$ is concave up are _____.

Hint: For the second part, once you've differentiated, don't start by trying to multiply out the numerator – factor out a copy of $(x^2 + 1)$ first.

Extra Work Space.

2. Let $f(x) = \begin{cases} x^2 - 1 & x < 0 \\ \frac{1}{x-1} & 0 \leq x \end{cases}$.

- (a) (1 point) The hypotheses of the Mean Value Theorem are true for $f(x)$ on exactly one of the intervals $[-1, 0]$ and $[0, 2]$. Which one is it? Explain your answer.
- (b) (2 points) At what points c in the interval you picked in part (a) is the conclusion of the Mean Value Theorem satisfied?